that describes how host data written to a logical volume or the like is striped across physical extents of non-volatile storage that are allocated to support mapped RAID.

[0074] Snapshot Metadata **408** may include or consist of metadata generated by and/or used by Snapshot Logic **410**, such as metadata that indicates and/or describes (e.g. points to) point in time copies referred to as "snapshots" that the Data Storage System **116** captures of storage objects such as logical volumes, LUNs (Logical Units), and/or other specific types of storage objects.

[0075] Data Deduplication Metadata **412** may include or consist of metadata generated by and/or used by Data Deduplication Logic **414**, such as one or more data structures (e.g. a table or the like) that associate crypto-digests generated from previously stored blocks of host data with the locations in non-volatile storage at which the corresponding blocks of host data were stored.

[0076] Data Compression Metadata **416** may include or consist of metadata generated by and/or used by Data Compression Logic **418**, such as indications (e.g. pointers) of locations in non-volatile storage at which previously compressed host data is stored, and/or indications of the specific type(s) of compression (e.g. compression keys, compression algorithms, etc.) that were used to compress the previously compressed host data.

[0077] Thin Provisioning Metadata **420** may include or consist of metadata generated by and/or used by Thin Provisioning Logic **422**, such as a data structure (e.g. a bit map) indicating which portions of the logical address space of a data storage object (e.g. a thin LUN or logical volume) have been allocated non-volatile data storage to handle received host I/O requests directed to the data storage object.

[0078] Logging Metadata **424** may include or consist of metadata generated by and/or used by Logging Logic **426**, such as a transaction log or the like storing metadata changes resulting from host I/O requests received by the Data Storage System **116**, and that can be "replayed" to recover the data storage system to a consistent state after a system crash.

[0079] FIG. **5** is a flow chart illustrating steps that may be performed during operation of some embodiments.

[0080] At step **500**, data storage space is selectively allocated for storing data storage metadata from data storage devices contained in a first storage enclosure that is directly connected to at least one storage processor of a data storage system. The data storage system further includes at least one secondary storage enclosure that is indirectly connected to the storage processor.

[0081] At step **502**, data storage metadata is generated within the data storage system.

[0082] At step **504**, the data storage metadata generated within the data storage system is stored into the data storage space that was selectively allocated for storing data storage metadata from the data storage devices contained in the first storage enclosure.

[0083] As will be appreciated by those skilled in the art, the technologies disclosed herein may be embodied as a system, method or computer program product. Accordingly, each specific feature of the present disclosure may be embodied using hardware, software (including firmware, resident software, micro-code, etc.) or a combination of software and hardware. Furthermore, the technologies disclosed herein may take the form of a computer program product embodied in one or more non-transitory computer readable storage medium(s) having computer readable program code stored thereon for causing a processor and/or computer system to carry out those aspects of the present disclosure.

[0084] Any combination of one or more computer readable storage medium(s) may be utilized. The computer readable storage medium may be, for example, but not limited to, a portable computer diskette, a hard disk, a random access memory (RAM), a read-only memory (ROM), an erasable programmable read-only memory (EPROM or Flash memory), a portable compact disc read-only memory (CD-ROM), an optical storage device, a magnetic storage device, or any suitable combination of the foregoing. In the context of this document, a computer readable storage medium may be any non-transitory tangible medium that can contain, or store a program for use by or in connection with an instruction execution system, apparatus, or device.

[0085] The figures include block diagram and flowchart illustrations of methods, apparatus(s) and computer program products according to one or more embodiments of the invention. It will be understood that each block in such figures, and combinations of these blocks, can be implemented by computer program instructions. These computer program instructions may be executed on processing circuitry to form specialized hardware. These computer program instructions may further be loaded onto a computer or other programmable data processing apparatus to produce a machine, such that the instructions which execute on the computer or other programmable data processing apparatus create means for implementing the functions specified in the block or blocks. These computer program instructions may also be stored in a computer-readable memory that can direct a computer or other programmable data processing apparatus to function in a particular manner, such that the instructions stored in the computer-readable memory produce an article of manufacture including instruction means which implement the function specified in the block or blocks. The computer program instructions may also be loaded onto a computer or other programmable data processing apparatus to cause a series of operational steps to be performed on the computer or other programmable apparatus to produce a computer implemented process such that the instructions which execute on the computer or other programmable apparatus provide steps for implementing the functions specified in the block or blocks.

[0086] Those skilled in the art will readily appreciate that programs defining the functions of the present invention can be delivered to a computer in many forms; including, but not limited to: (a) information permanently stored on non-writable storage media (e.g. read only memory devices within a computer such as ROM or CD-ROM disks readable by a computer I/O attachment); or (b) information alterably stored on writable storage media.

[0087] While the invention is described through the above exemplary embodiments, it will be understood by those of ordinary skill in the art that modification to and variation of the illustrated embodiments may be made without departing from the inventive concepts herein disclosed.

What is claimed is:

1. A method comprising:

selectively allocating data storage space for storing data storage metadata from non-volatile data storage devices contained in a first storage enclosure that is